of collectors and cactus growers, the importance of whose cooperation in this knotty group can not be overestimated. The work will appear in ten fascicles at intervals of two months, constituting when complete a handsome royal octavo volume of 600 pages or more.

With the exception of a rather comprehensive introduction devoted to general morphology and geographic distribution, the work is purely systematic, with short, excellent, clear cut descriptions. In his chapter on distribution the author brings up the old but interesting question of the origin of old world forms. The original home of *Opuntia vulgaris* remains unsettled. The widespread occurrence of Rhipsalis in tropical Africa is logically accounted for through the instrumentality of bird migration, the mucilaginous juice of the berry suggesting the possibility of an occasional seed clinging to feathers for a considerable period. The "author's index" presents a novel feature in the form of personal or biographical comment, furnishing to cactus lovers an interesting and useful compendium of information.

The family is subdivided as follows:

I. Subfamily CEREOIDEÆ.

Tribe 1. *Echinocacteæ.*—Cereus, Pilocereus, Cephalocereus, Phyllocactus, Epiphyllum, Echinopsis, Echinocereus, Echinocactus, Melocactus, Leuchtenbergia.

Tribe 2. *Mamillariæ.*—Mamillaria, Pelecyphora, Aniocarpus.

Tribe 3. *Rhipsalideæ.*—Pfeiffera, Hariota, Rhipsalis.

II. Subfamily OPUNTIOIDEÆ.

Tribe 4. *Opuntiæ.*—Opuntia, Nopalea, Pterocactus.

III. Subfamily PEIRESKIOIDEÆ.

Tribe 5. *Peireskieæ.*—Peireskia.

It will be noticed from the above that twenty genera are recognized, of which one is new. *Cephalocereus* (Pfeiff.) em. K. Sch. has for its typical representative our Mexican "old man cactus," *Cephalocereus senilis. Pterocactus* K. Sch., from Argentina, is a most remarkable representative of the Opuntioideæ, being distinguished not only from the other genera of its tribe, but from all other Cactaceæ, by its circumscissile dehiscent capsule and broadly winged seed.

Further particulars, so far as they are of general systematic interest, will be mentioned from time to time in this journal as the successive parts appear. —E. B. ULINE.

Septal nectaries.

Though numerous studies have been made of the nectar glands of the ovarian septa of monocotyledons, first described in 1855 by Brongniart, Schniewand-Thies[4] has submitted them to a comparative examination as to

[4] J. SCHNIEWAND-THIES.—Beiträge zur Kenntnis der Septalnectarien. Pp. 87, *pl. 12*. Gustav Fischer: Jena. 1897. *M.* 15.

their morphology and the behavior of their cell contents during the period of greatest activity.

From the simple external nectary of *Tofieldia palustris*, in which the secretion is effected by the epidermal cells of the entire outer wall of the ovary, appearing first as a subcuticular accumulation, and the slightly more specialized nectary of *T. calyculata*, where the similarly subcuticular secretion is limited to the epidermal cells of the septal grooves, a gradually increasing complexity is traced to the Bromeliaceæ, which have complex branched glands deeply seated in the tissues of the ovary — though they really represent gaps between the partially fused carpels, so that they are likewise lined by epidermal cells, which, however, have a well-developed subjacent secreting parenchyma — and the conclusion is reached that the simplest glands belong to genera or species which stand lowest in the systematic classification.

The results of the morphological study are summarized in the tabulation of septal nectaries under the following seven groups, in which the increasing size and complexity of the glands is accompanied by a corresponding development of the vascular system of the ovarian walls:

A. *Ovary superior.*

1. Simple external nectaries (Tofieldia).
2. Double nectaries, in which each outer nectariferous groove passes at top into a septal fissure which is commonly more active (Scilla, Yucca).
3. Inner nectaries, having the general structure of the preceding, but the inner clefts only active (Asparagus, Allium).

B. *Ovary partly inferior.*

4. Mostly double nectaries, with the inner cleft increased in surface by being folded, and the upper part sometimes reduced to a mere duct (Phormium, Hemerocallis).

C. *Ovary inferior.*

5. Double nectaries, the inner clefts more or less complicated (Beschorneria, Crocus).
6. Inner nectaries, opening at top of the ovary (Agave), or in ducts near its middle (Bilbergia).

D. *Ovary superior or partly inferior.*

7. Nectary consisting of three outer and three inner septal fissures, and three inner clefts pertaining to the sutures of the several carpels, into the cavities of which and the stylar canal they run, above (Pitcairnia, Dyckia, Vriesea).

The general conclusion is reached that the cell contents of the secreting tissues are actively concerned in (1) the storage of carbohydrates and albuminoids which are subsequently used in the formation of nectar; (2) supplying the necessary water; (3) converting the accumulated materials into nectar; (4) the spontaneous passage of the nectar outwards.

As a rule, to which Hemerocallis offers exceptions, the nuclei of the secreting tissues become disorganized and dissolve earlier than those of the

adjacent parenchyma, though at first richer in chromatin. In most active nectaries they are said to have a predilection for blue stain, though in some cases they have been found, either at first or throughout, to take the red stain by preference.

The behavior of the chromatin and nucleolar contents of the nuclei during activity of the gland appears to differ greatly in different plants, but in general one or both diminishes noticeably. Nuclei becomes deformed and lobed or even fragmented, send out pseudopodia like prolongations to the ends of which plasma threads become attached, or the nuclear membrane is absorbed and the nuclear material diffuses in the cytoplasm, which itself gradually diminishes or even disappears; meantime the starch accumulation in the vicinity of the nectary is used up, though some reserve starch is often brought into this tissue later.

In the main the descriptions of structure are clearly written, and the plates are all excellently drawn and reproduced. If any fault were to be found with the paper it would be that the student of a given genus or species is confused by the division of the work and plates into separate sections, each of which contains partial studies of a number of species, which, in the absence of a general index, cannot well be united by the reader.—W. T.

Physiological plant anatomy.[5]

THE first edition of this book appeared in 1884. In its preface the author explains that his endeavor was to make plain the connection between anatomical structure and physiological performance. In the preface of the present edition the author states that the subject has made such progress that the book must be much enlarged. The plan and manner of arrangement has not been materially changed, about 150 pages and 95 illustrations having been added. The same number of chapters is retained, although an entirely new one on the apparatus for special functions is added; the two on normal and abnormal growth in thickness being here combined. An introduction and a discussion of the plant cell is added to the first chapter. In short, while still holding to the same object as before, the book is enlarged and improved in every chapter. The author says of the new edition:

> It is no longer the elements of physiological anatomy, but a veritable text-book; not a hand book or cyclopedia, because a great deal of relevant matter has been omitted. All the research that serves only to broaden our knowledge is omitted, and only that used which has deepened it.

One of the most helpful additions to the new edition is the introduction, where the author states clearly and fully the meaning of the expression "physiological plant anatomy." In doing this he gives a new significance to

[5] HABERLANDT, DR. G.—Physiologische Pflanzenanatomie, Wilhelm Engelmann: Leipzig. 1896.